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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/003,044	12/06/2001	Hajime Matsumoto	43247	4952
1609	7590	07/27/2004	EXAMINER	
ROYLANCE, ABRAMS, BERDO & GOODMAN, L.L.P.			PUTTLITZ, KARL J	
1300 19TH STREET, N.W.			ART UNIT	
SUITE 600			PAPER NUMBER	
WASHINGTON,, DC 20036			1621	

DATE MAILED: 07/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/003,044	MATSUMOTO ET AL.	
	Examiner	Art Unit	
	Karl J. Puttlitz	1621	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 June 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

The amendments dated June 7, 2004 has been entered.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,414,182 to Shingai et al. (Shingai) is maintained.

The invention is drawn to a process for producing hydroxyalkyl (meth)acrylate by reacting (meth)acrylic acid with alkylene oxide to produce the hydroxyalkyl (meth)acrylate, comprising producing a resultant reaction liquid in a reaction apparatus where the resultant reaction liquid contains crude hydroxyalkyl (meth)acrylate, unreacted (meth)acrylic acid and unreacted alkylene oxide (b) introducing the resultant reaction liquid into a distillation apparatus and distilling the reaction liquid under an operational pressure of 1 to 40 hPa to remove unreacted (meth)acrylic acid, (c) recovering the unreacted (meth)acrylic acid by the distillation of the resultant reaction liquid, (d) recycling and introducing the unreacted (meth)acrylic acid recovered from the distillation apparatus into the reaction apparatus as a raw material for the reaction.

Shingai teaches "an addition reaction between the carboxylic acid and the alkylene oxide is carried out in the presence of a catalyst." See column 2, lines 30-31.

Examples of the carboxylic acid usable in Shingai include "acrylic acid, methacrylic acid, acetic acid, propionic acid, butyric acid, maleic acid, fumaric acid, succinic acid, benzoic acid, terephthalic acid, trimellitic acid, and pyromellitic acid, but acrylic acid and methacrylic acid (which are generically referred to as (meth)acrylic acid) are particularly preferable. In addition, the alkylene oxide, usable in the present invention, preferably has 2.about.6 carbon atoms, more preferably 2.about.4 carbon atoms. Examples thereof include ethylene oxide, propylene oxide, and butylene oxide. Among them, ethylene oxide and propylene oxide are preferable, and ethylene oxide is particularly preferable." See paragraph bridging columns 2 and 3.

Example 1 teaches an autoclave was charged with a catalyst, 5 g of hydroquinone monomethyl ether as a polymerization inhibitor, and acrylic acid to prepare a total amount of 600 ml of mixture. The resultant mixture was heated to 70C., and then air in the autoclave was replaced with nitrogen gas. Thereafter, ethylene oxide and acrylic acid (containing hydroquinone monomethyl ether in a ratio of 1.0 weight %) were continuously supplied into the autoclave at rates of 101 g/h and 109 g/h respectively (ethylene oxide/acrylic acid=1.5 (molar ratio)). The resultant reaction liquid was continuously extracted such that the liquid level in the autoclave could be fixed during the reaction.

The resultant mixture is:

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Conversion of acrylic acid:	86 mol %
Conversion of ethylene oxide:	58 mol %
Molar ratio of ethylene oxide/acrylic acid:	4.7
Selectivity of diethylene glycol monoacrylate (based on the conversion of acrylic acid; hereinafter the same):	1.7 mol %
Selectivity of diester (based on the conversion of acrylic acid; hereinafter the same):	0.18 mol %

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Shingai also teaches purification of the final product by removal of the raw starting materials, e.g., by distillation: “[t]he conversion in this addition reaction is often less than 100%, therefore generally such as a portion of the carboxylic acid or alkylene oxide remains unreacted in the reaction at the end of the reaction. Thus, the above reaction liquid is led to the step to remove such as these unreacted residues of raw materials from the reaction liquid, and then purified by such as distillation as the subsequent final step, with the result that the aimed hydroxyalkyl ester is obtained.” See column 2, lines 30-40.

Shingai also teaches recycling at recycling alkylene oxide or the carboxylic acid, either separately or together. Specifically, the references teaches that “raw carboxylic acid and the raw alkylene oxide into the reactor, they may be added from their separate lines, or they may be premixed together in such as piping, a line mixer, or a mixing tank and then added into the reactor. In addition, in the case where a reactor outlet liquid is circulated into a reactor inlet, or in the case where an unreacted residue of the alkylene oxide or carboxylic acid is recovered and then recycled, these liquids may be mixed with the raw carboxylic acid or the raw alkylene oxide and then added into the reactor.

However, in the case where the raw carboxylic acid and the raw alkylene oxide are added from their separate feeding lines into the reaction liquid, the molar ratio in the reaction liquid is such that the carboxylic acid is excessive near an inlet into which the carboxylic acid is added, therefore it is preferable that the above raw materials are premixed together in such as piping and then added into the reactor." See column 3, lines 41-57.

The difference between Shingai and the claimed inventions is that Shingai does not teach the invention with particularity so as to amount to anticipation (See M.P.E.P. § 2131: However, based on the above, Shingai teaches the elements of the claimed invention with sufficient guidance, particularity, and with a reasonable expectation of success, that the invention would be *prima facie* obvious to one of ordinary skill (the prior art reference teaches or suggests all the claim limitations with a reasonable expectation of success. See M.P.E.P. § 2143).

Applicant argues that the reference does not disclose recovering unreacted (meth)acrylic acid from the distillation apparatus during the distillation of the reaction liquid containing the unreacted raw materials and crude hydroxyalkyl (meth)acrylic acid, and thereafter recycling and introducing the recovered (meth)acrylic acid to the reaction apparatus.

However, Shingai specifically teaches that the reaction liquid is led to the step to remove such as these unreacted residues of raw materials from the reaction liquid, and then purified by such as distillation as the subsequent final step, with the result that the aimed hydroxyalkyl ester is obtained. See column 2, lines 35-40.

However, Shingai specifically teaches that “a portion of the carboxylic acid or alkylene oxide remains unreacted in the reaction at the end of the reaction. Thus, the above reaction liquid is led to the step to remove such as these unreacted residues of raw materials from the reaction liquid”. The reference also specifically teaches that “the resultant crude hydroxyalkyl ester may further be purified. The purification method is not especially limited, but examples thereof include purification by distillation, specifically, distillation involving the use of such as conventional distillation columns or rectifying columns (e.g. packed columns, bubble cap columns, perforated-plate columns), but there is no especial limitation thereto.” From these passages, one of ordinary skill would expect that at least portions of unreacted starting materials, including (meth)acrylic acid, would be separated from the reaction mixture during this step. In this regard, there is no evidence or comment of record showing that starting materials may not be recovered during this disclosed step. Otherwise, recovering starting materials during the disclosed distillation is within the motivation of those of ordinary skill.

Shingai also teaches the claimed recycling. Specifically, unreacted residue of the alkylene oxide or carboxylic acid is recovered and then recycled, these liquids may be mixed with the raw carboxylic acid or the raw alkylene oxide and then added into the reactor.” See column 3, lines 46-48. Accordingly, Shingai teaches all of the elements of the claimed invention, as amendmend, with a reasonable expectation of success.

### ***Conclusion***

Art Unit: 1621

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karl J. Puttlitz whose telephone number is (571) 272-0645. The examiner can normally be reached on Monday-Friday (alternate).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Johann Richter can be reached on (571) 272-0646.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1235.

Karl J. Puttlitz  
*Assistant Examiner*

A handwritten signature in black ink, appearing to read 'J. Richter', with a stylized flourish below it.

Johann R. Richter, Ph.D., Esq.  
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Art Unit 1621  
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